

What is claimed is:

1.

A biodegradable, oxidized cellulose ester.

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2.

A biodegradable, oxidized cellulose ester according to claim 1 containing at least 3% by weight carboxyl content.

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3.

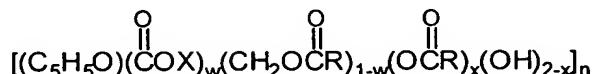
A biodegradable, oxidized cellulose ester according to claim 2 containing between about 3-25% by weight carboxyl content.

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4.

An oxidized cellulose ester according to claim 1 having the following general formula I or II:

I.



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wherein:

X is selected from the group consisting of H, Na, K, Ca, NH<sub>4</sub>, and NEt<sub>3</sub>H;

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R is selected from the group consisting of H; CF<sub>3</sub>; (CH<sub>2</sub>)<sub>n</sub>CH<sub>3</sub>, where n is from 0 to 18; (CH<sub>2</sub>)<sub>n</sub>COOH, where n is from 1 to 8; CY=CZCOOH, where Y and Z are each one of hydrogen, methyl, branched alkyl having from 1 to 20 carbon atoms and from one to three *cis* or *trans* double bonds; branched alkenyl having from 1 to 20 carbon atoms and having from one to three *cis* or *trans* double bonds; CY=CH<sub>2</sub>, where Y is H, methyl, or phenyl; CH=CHY, where Y is

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C<sub>6</sub>H<sub>5</sub>; CH=CYCOOH, where Y is H or CH<sub>3</sub>; (CH<sub>2</sub>)<sub>8</sub>CH=CH(CH<sub>2</sub>)<sub>8</sub>CH<sub>3</sub>; or C<sub>6</sub>H<sub>(2-6)</sub>(COOH)<sub>0-4</sub>, CH<sub>2</sub>CH(COOH)CH<sub>2</sub>-COOH;

w is 0.1-1.0;

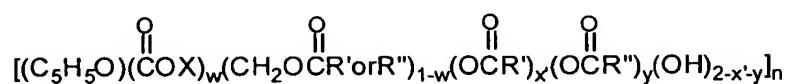
x is 0.1-2.0; and

5 n is 30-1500.

and

II.

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wherein:

15 X is selected from the group consisting of H, Na, K, Ca, NH<sub>4</sub>, and NET<sub>3</sub>H;

R, R', and R" are each selected from the group consisting of: H; CF<sub>3</sub>; (CH<sub>2</sub>)<sub>n</sub>CH<sub>3</sub>, where n is from 0 to 18; (CH<sub>2</sub>)<sub>n</sub>COOH, where n from 1 to 8;

20 CY=CZCOOH, where Y and Z are independently selected from the group consisting of hydrogen, methyl, branched alkyl having from 1 to 20 carbon atoms and from one to three *cis* or *trans* double bonds; branched alkenyl having from 1 to 20 carbon atoms and having from one to three *cis* or *trans* double bonds; CY-CH<sub>2</sub>, where Y is H, methyl, or phenyl; CH=CHY, where Y is C<sub>6</sub>H<sub>5</sub>; CH=CYCOOH, where Y is H or CH<sub>3</sub>; (CH<sub>2</sub>)<sub>8</sub>CH=CH(CH<sub>2</sub>)<sub>8</sub>CH<sub>3</sub>; or C<sub>6</sub>H<sub>(2-6)</sub>(COOH)<sub>0-4</sub>, CH<sub>2</sub>CH(COOH)CH<sub>2</sub>-COOH;

25 w is 0.1-1.0;

x is 0.1-1.9;

y is 0.1-1.9; and

n is 30-850.

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5.

An oxidized cellulose ester according to claim 4 that has the general structure I or II, whereby R is  $(CH_2)_nCH_3$ , and n is 0 to 5.

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6.

An oxidized cellulose ester according to claim 4 that has the general structure I or II, whereby R is  $(CH_2)_nCOOH$ , and n is 2 to 4.

7.

10 An oxidized cellulose ester according to claim 1 that is dried.

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An oxidized cellulose ester according to claim 1 that is in a monolithic transparent film.

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9.

An oxidized cellulose ester according to claim 1 that is in a biodegradable coating.

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10.

An oxidized cellulose ester according to claim 1 that is present in a product selected from the group consisting of a pharmaceutical, an agricultural product, and a veterinary composition.

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11.

An oxidized cellulose ester according to claim 1 that is soluble in at least one solvent selected from the group consisting of water, ketones, esters, glycol ethers, glycol ether acetates, alcohols, methylene chloride, halogenated solvents, and aprotic solvents.

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12.

An oxidized cellulose ester according to claim 11 whereby the aprotic solvents are selected from the group consisting of DMSO, DMA, DMF, and n-methyl-2-pyrrolidone.

13.

A method of making an oxidized cellulose ester comprising: oxidized cellulose containing at least 3% by weight carboxylic content to form an oxidized cellulose ester.

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14.

A method according to claim 13 whereby the acylating step comprises: reacting the oxidized cellulose with an organic acid.

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A method according to claim 14 whereby the organic acid is a C<sub>1</sub>-C<sub>3</sub> organic acid.

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16.

A method according to claim 13 whereby the acylating step comprises: reacting the cellulose with an organic acid and an acid anhydride.

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18.

A method according to claim 13 further including the step of soaking the oxidized cellulose with a swelling agent prior to the acylating step.

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19.

A method according to claim 18 whereby the swelling agent is selected from the group consisting of phosphoric acid, isopropyl alcohol, aqueous zinc chloride solution, water, and an amine.

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A method according to claim 18 whereby the oxidized cellulose is soaked in the swelling agent for a time period of between about 5 to 120 minutes.

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21.

A method according to claim 20 whereby the oxidized cellulose is soaked in the swelling agent for a time period of between about 30-60 minutes.

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22.

A method according to claim 13 whereby the oxidized cellulose is acylated in the presence of an acid catalyst.

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23.

A method according to claim 22 whereby the acid catalyst is selected from the group consisting of sulfuric acid, o-phosphoric acid, perchloric acid, and zinc chloride solution.

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24.

A method according to claim 13 whereby the oxidized cellulose is acylated in the presence of an organic solvent.

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25.

A method according to claim 24 whereby the organic solvent is selected from the group consisting of DMSO, DMF, DMA, and dioxane.

26.

A method according to claim 13 whereby the acylating step comprises:

reacting the oxidized cellulose with an organic acid chloride, in an organic solvent, and a base catalyst.

27.

5 A method according to claim 26 whereby the organic acid chloride is a C<sub>1</sub>-C<sub>20</sub> organic acid chloride.

28.

A method according to claim 26 whereby the organic solvent is selected from the group consisting of DMSO, DMF, DMA, and dioxane.

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29.

A method according to claim 26 whereby the base catalyst is selected from the group consisting of pyridines, alkylpyridines, trialkylamines and sodium carbonate.

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A method according to claim 13 whereby the acylating step takes place at a temperature ranging between about 5-125°C.

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31.

A method according to claim 13 whereby the acylating step takes place for a time period of about 0.5-12 hours.

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32.

A method according to claim 13 further including the step of filtering the oxidized cellulose ester.

33.

A method according to claim 32 further including the step of washing the oxidized cellulose ester to a pH between about 6-8 following the filtering step.

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34.

A method according to claim 33 further including the step of drying the oxidized cellulose ester following the washing step.

35.

A pharmaceutical containing the oxidized cellulose ester of claim 1.

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